

ANALYSING THE IMPACT OF EMERGING TRANSPORTATION TECHNOLOGIES AND BUSINESS MODELS ON URBAN STRUCTURE

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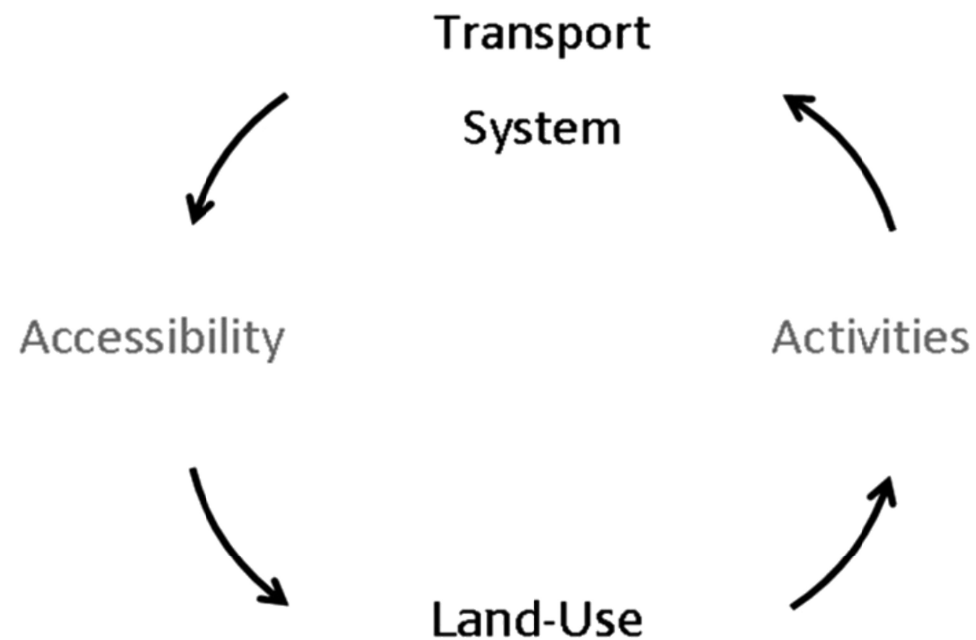
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Outline

- Literature Review
 - Methodology
- Simulation Results
 - Conclusions

Literature Review



Source: Wegener and Fürst (1999)

DELTA

- Ability for Dynamic Modelling
 - Non – Full Integration
- Flexibility in different parts of modelling
 - Analytic Land Use Component

Literature Review

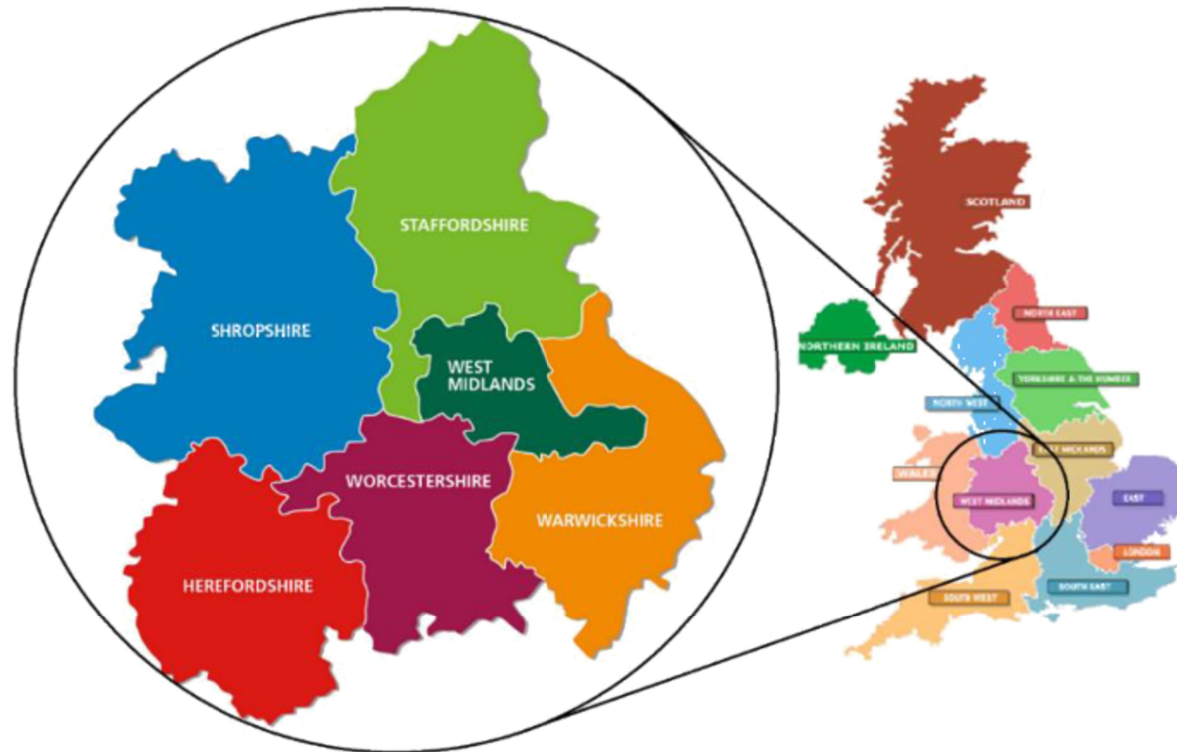
New Transport Technologies

- Autonomous Vehicles
- Connected Vehicles
- Electric Vehicles

Business Models

- Mobility as a Service (MaaS)
- On Demand Transport
- Car Sharing

Methodology



Source: <https://shorturl.at/akuH2>

West Midlands region (UK)

- Third smallest region of England
- West Midlands County- most populous urban areas (Birmingham and Coventry)
- Population- 5 million
- Diverse in terms of demographic, spatial and geographical characteristics

Methodology

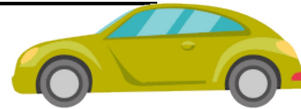
Future Scenario name	Higher adoption rates of CAVs and EVs in the fleet in the CBDs	Same adoption rates of CAVs and EVs in the fleet across region	Higher rates of people working from home
F1		✓	
F2		✓	✓
F3	✓		
F4	✓		✓

Methodology

Investigation of
costs in West
Midlands

Transport

GC Estimations



Source:
<https://bit.ly/3bGV9QM>

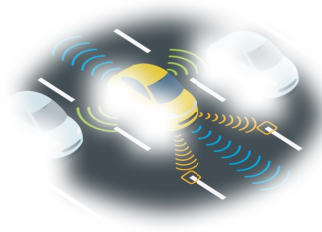
- Vehicle Operating Costs
- Value of Time
- Proportions in the fleet



Source: <https://bit.ly/3p1bVhg>

- New Functions
- Logsum Function

PCU (connectivity)



Source: <https://bit.ly/3sGxPc4>

Land Use

TCO Estimations

- Palmer et al. (2018)
- Proportions- fleet



Source: <https://bit.ly/3o0a5ft>

Mobility Investment Model

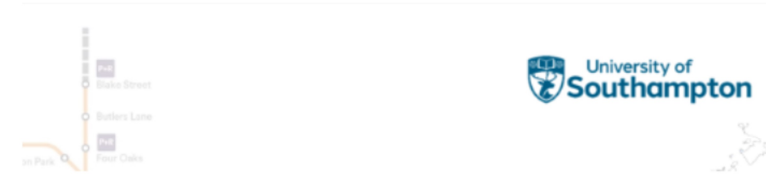
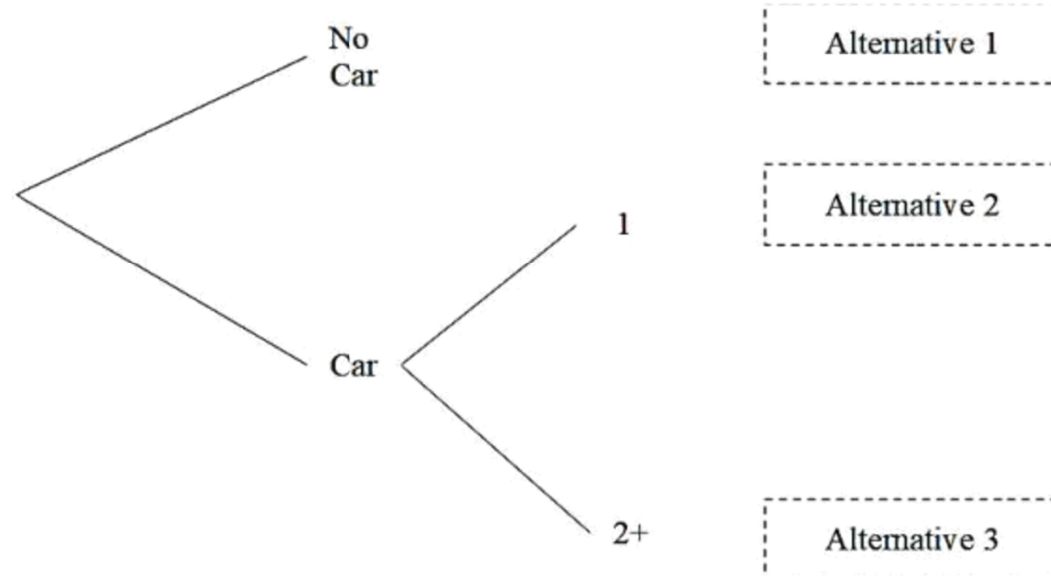
Methodology

Stated preference (SP) experiment

Fractional factorial design (8 scenarios)

Different – Demographic characteristics

Two pilot surveys – Prolific



Scenario 1 from 8

Which of the options do you think your household would consider choosing?

If your household would not consider choosing any of the available options, please select the most preferable one of the two.

Option A: £ 66.5/ week

1. Own 1 car - Minimum cost of operation £53/ week
2. No Subscription to Mobility Solution - £0/week
3. Subscription to other services (Car Clubs: 1 x 5-mile drive - £2.5, Uber: 1 x 5-mile ride - £11)



Option B: £ 68/ week

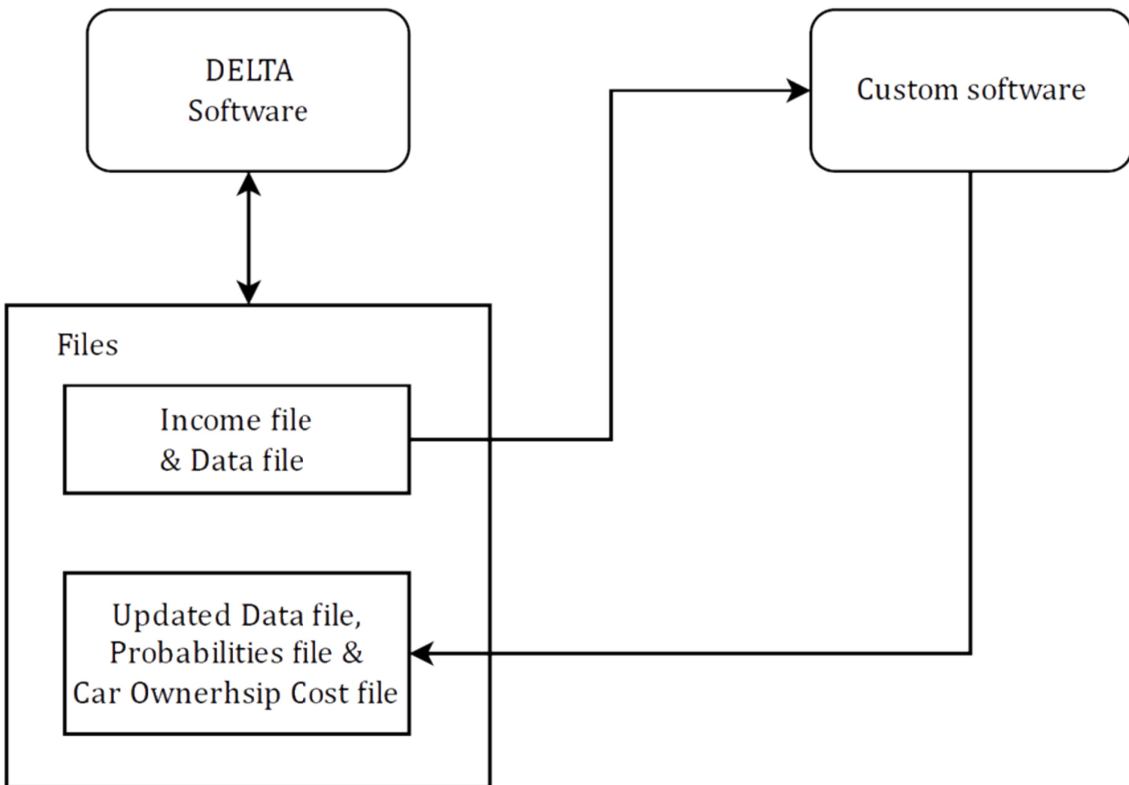
1. Own no car - Minimum cost of operation £0/ week
2. Mobility Solution (Unlimited Public Transport, Unlimited Uber and Unlimited Car Clubs with a self-driving car) - £57/week
3. Subscription to other services (Uber: 1 x 5-mile ride - £11)



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Methodology



2024NS

TRANSFORMING TRANSPORT

Transport à Haut Niveau Service

University of Southampton

Hello!

My name is Paraskevi Sarri and I am a Ph.D. Candidate at the University of Southampton in the United Kingdom.

I am inviting you to participate in this study that investigates experts' views on the impact of new transportation technologies and business models on current transportation systems and on the urban structure.

This study will be conducted in 2 or 3 Rounds to reach experts' consensus, thus you will most probably be invited after a period of time to participate again.

The survey is expected to take 10 minutes of your time.

You will be initially asked questions related to the area of expertise, then to the impact of new transportation technologies and business models on transportation-related variables and modeling procedures and finally you will be asked questions on the possible impact these might have on accessibility and land use.

This study was approved by the Faculty Research Ethics Committee (FREC) at the University of Southampton (Ethics/ERGO Number: 76855). You can access more information: [Here](#)

- Please consider answering the questions, even if you think that some of them are outside your area of expertise
- Note that the aggregated results from round 1 will be made available to you in the following rounds, and also that the responses will be used in the Ph.D. research project. However, all individual responses are and will remain confidential.

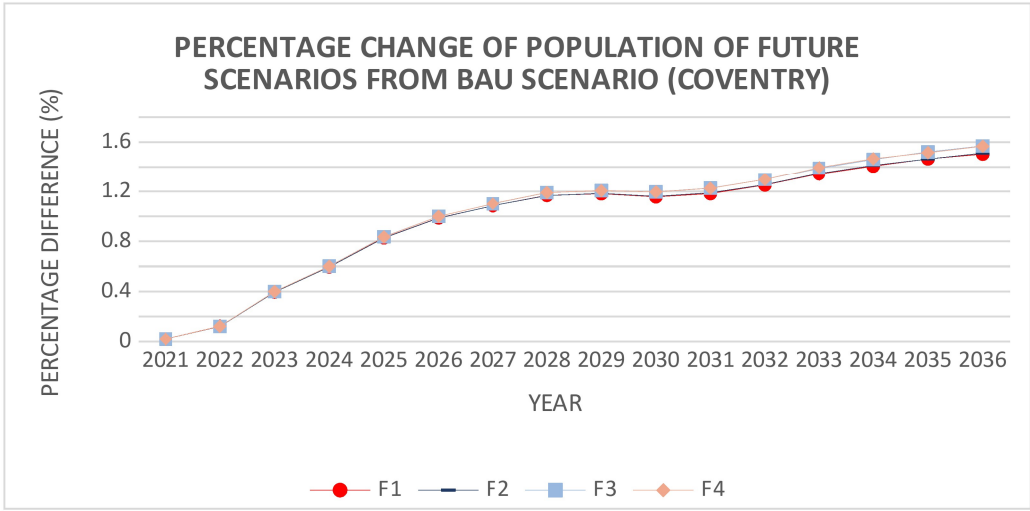
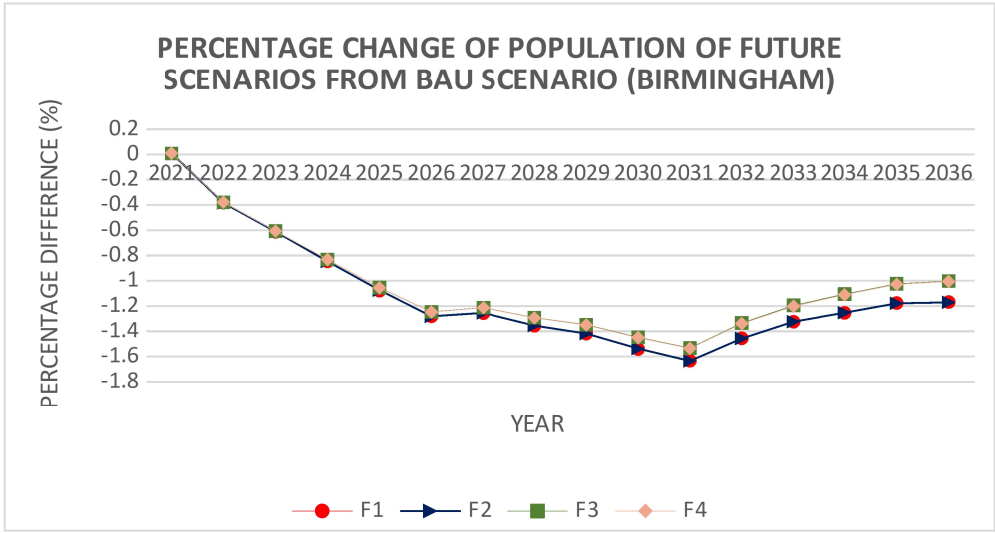
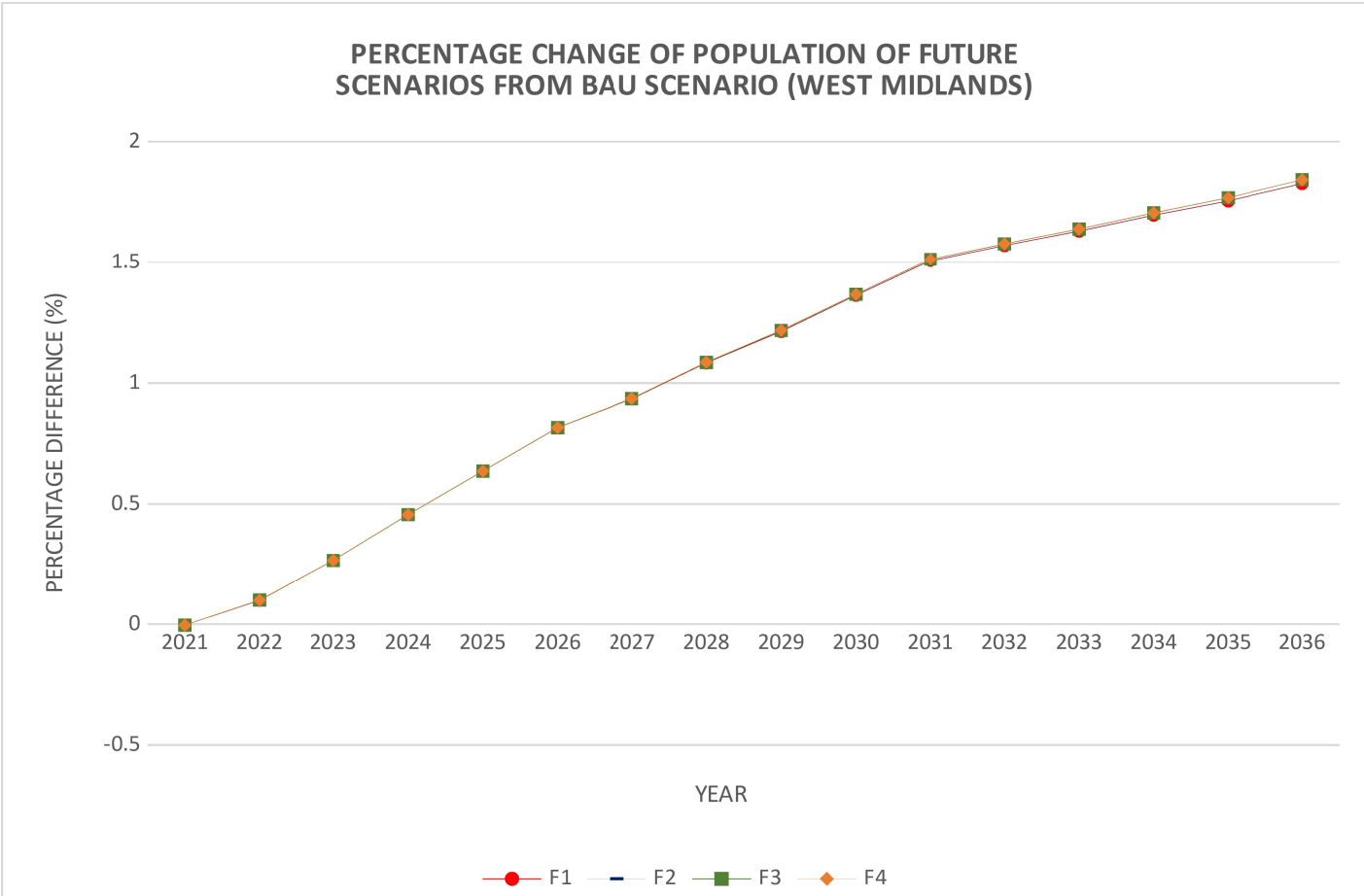
Do you consent in participating in this survey?

☐ Yes

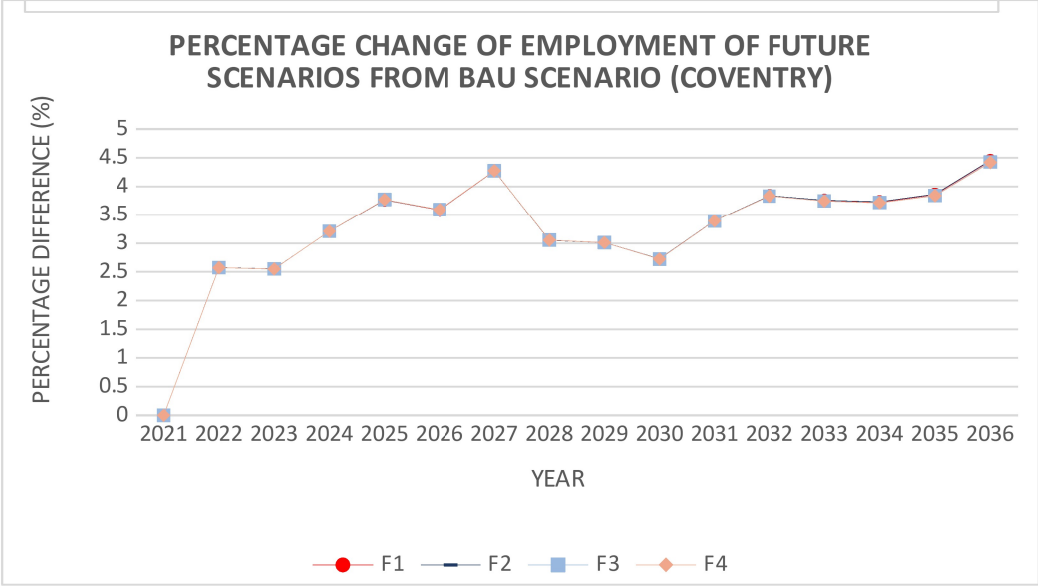
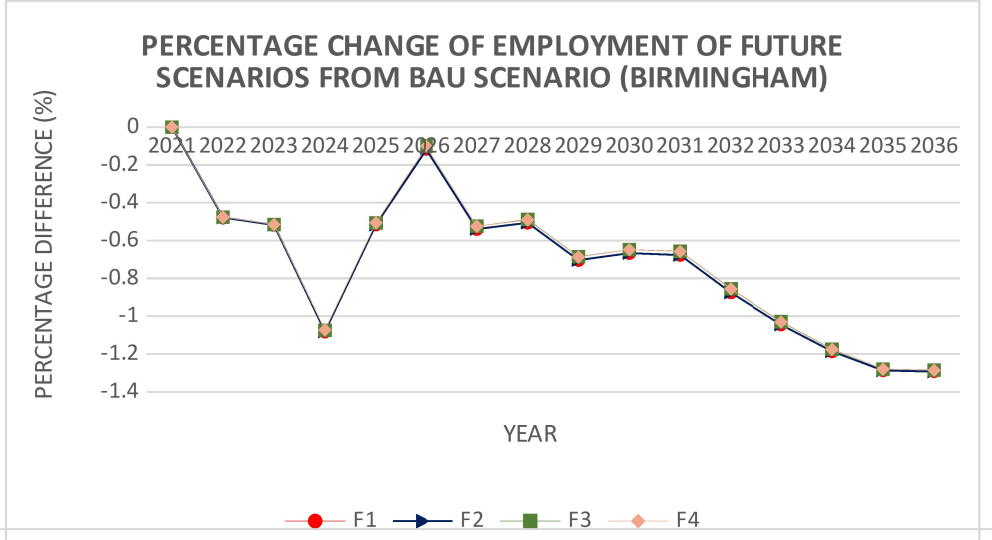
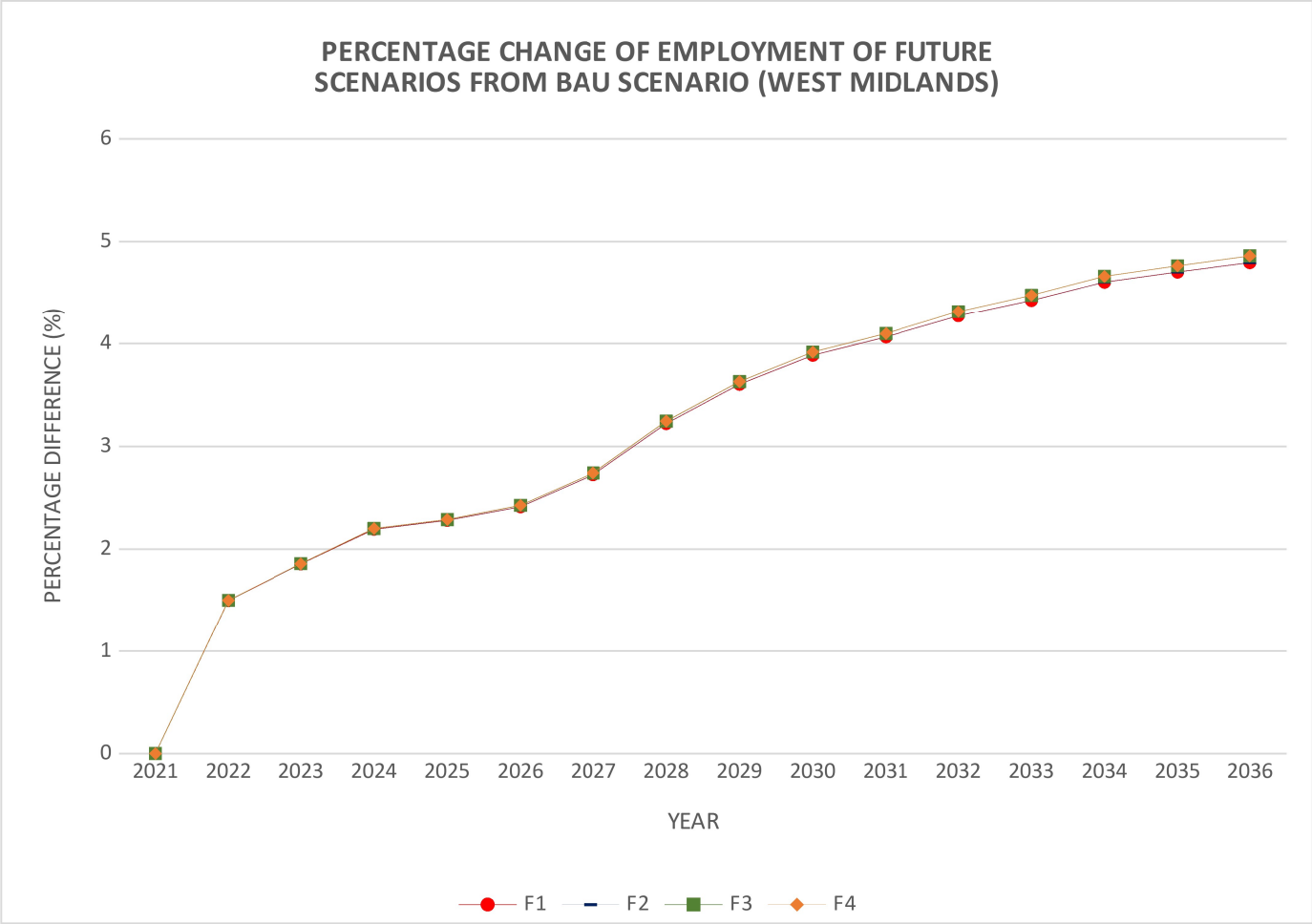
☐ No

Survey Completion

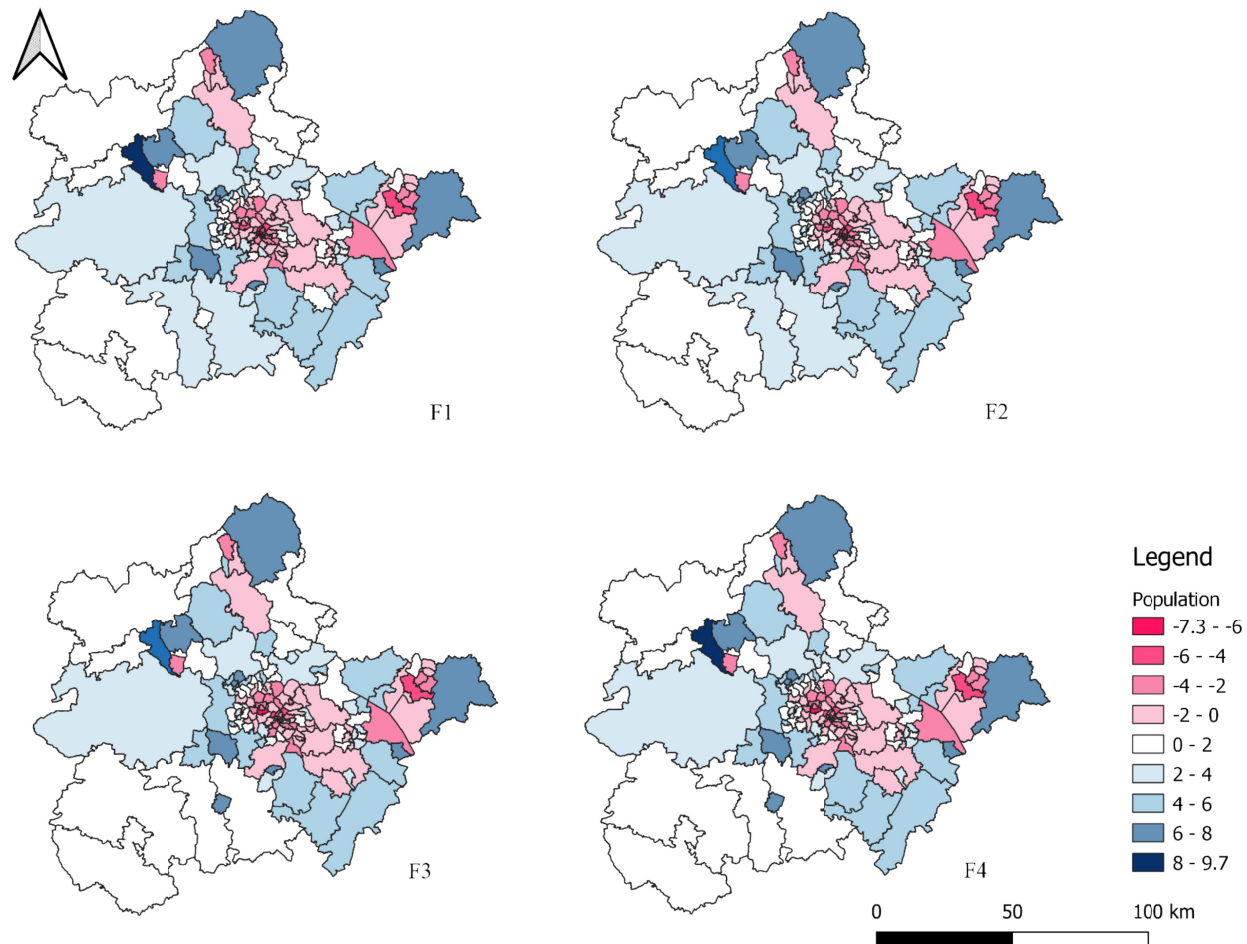
Simulation Results



Simulation Results



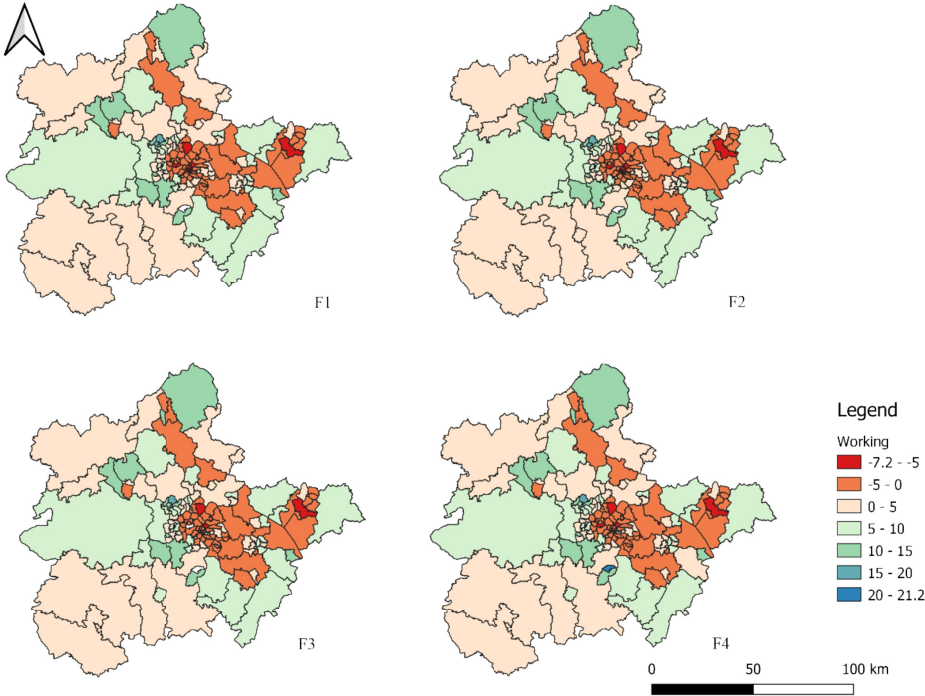
Simulation Results



Population:

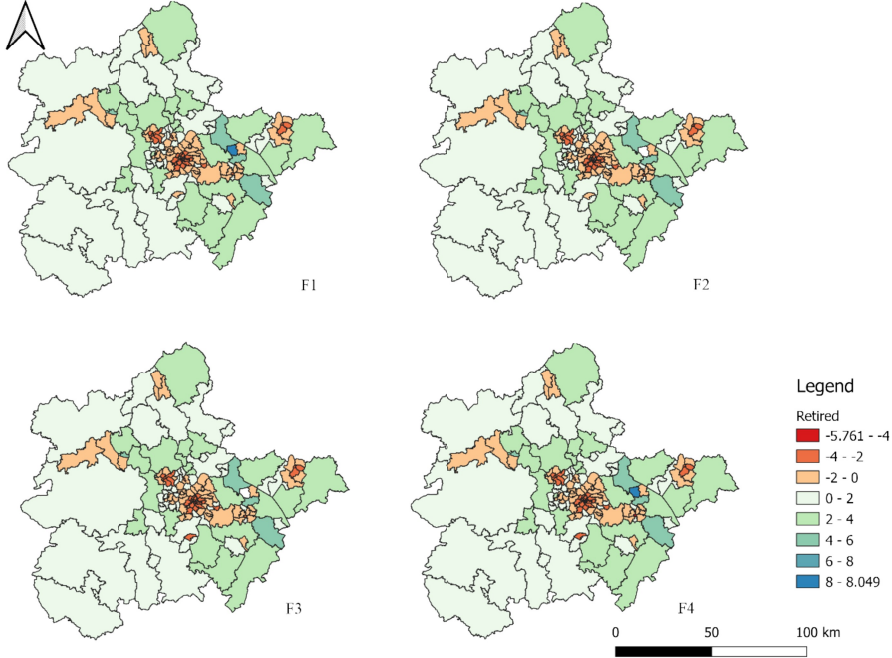
- Similar patterns in all scenarios
- Decrease in bigger cites & increase in smaller
- Increase in outskirts
- Urban sprawl

Simulation Results



Retired Population:

- Attracted to peripheral zones

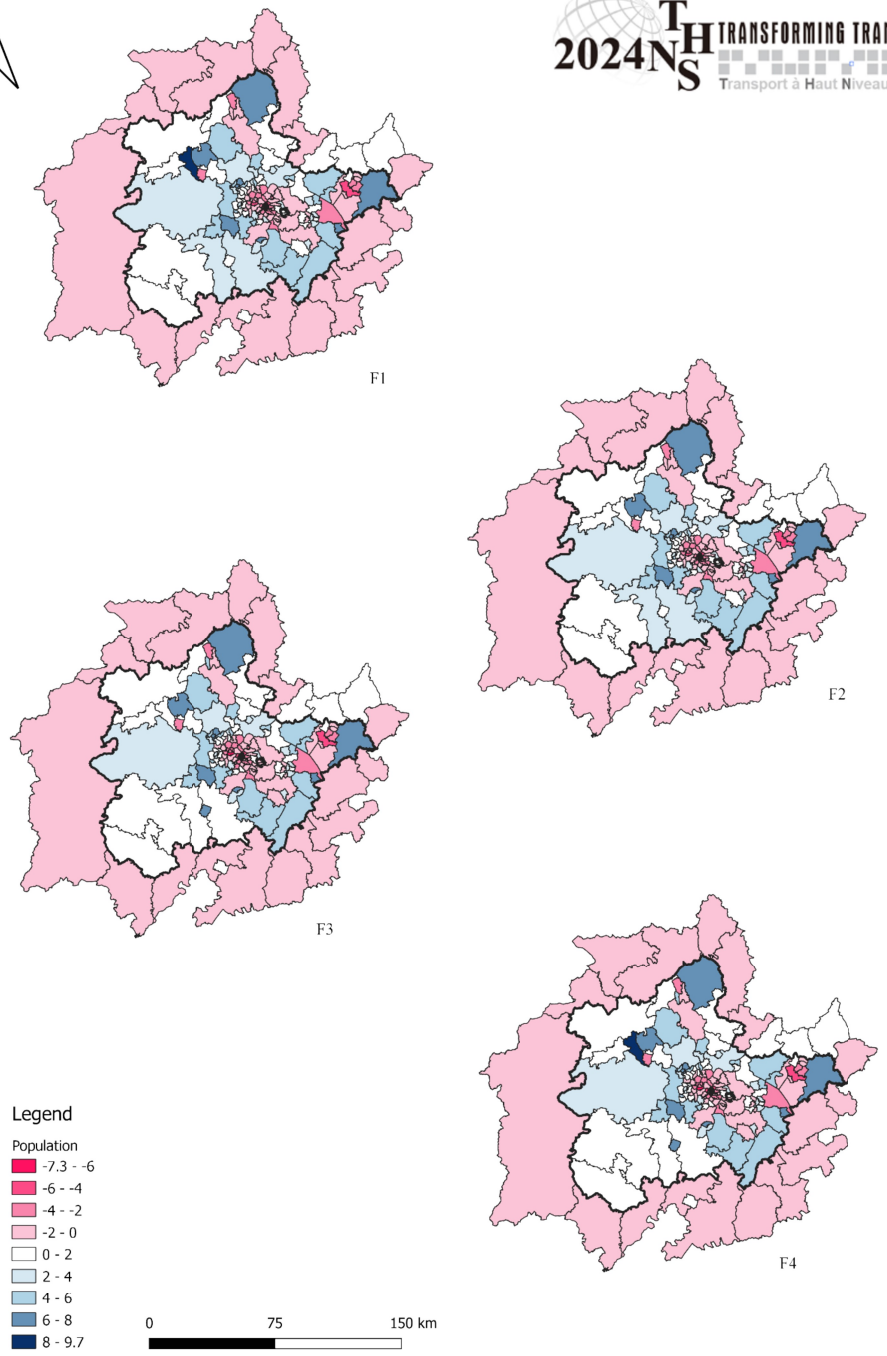


Simulation Results



Population:

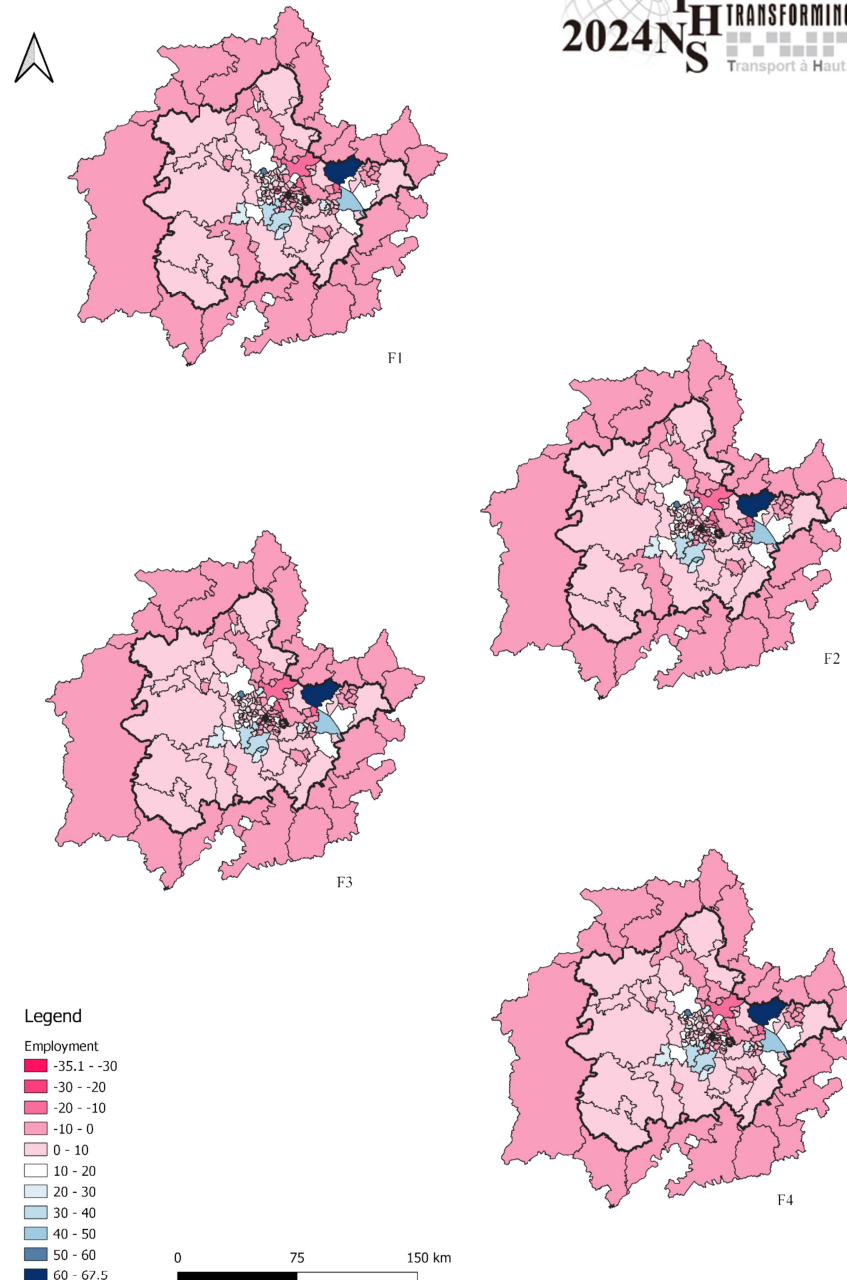
- Attracted from adjacent zones



Simulation Results

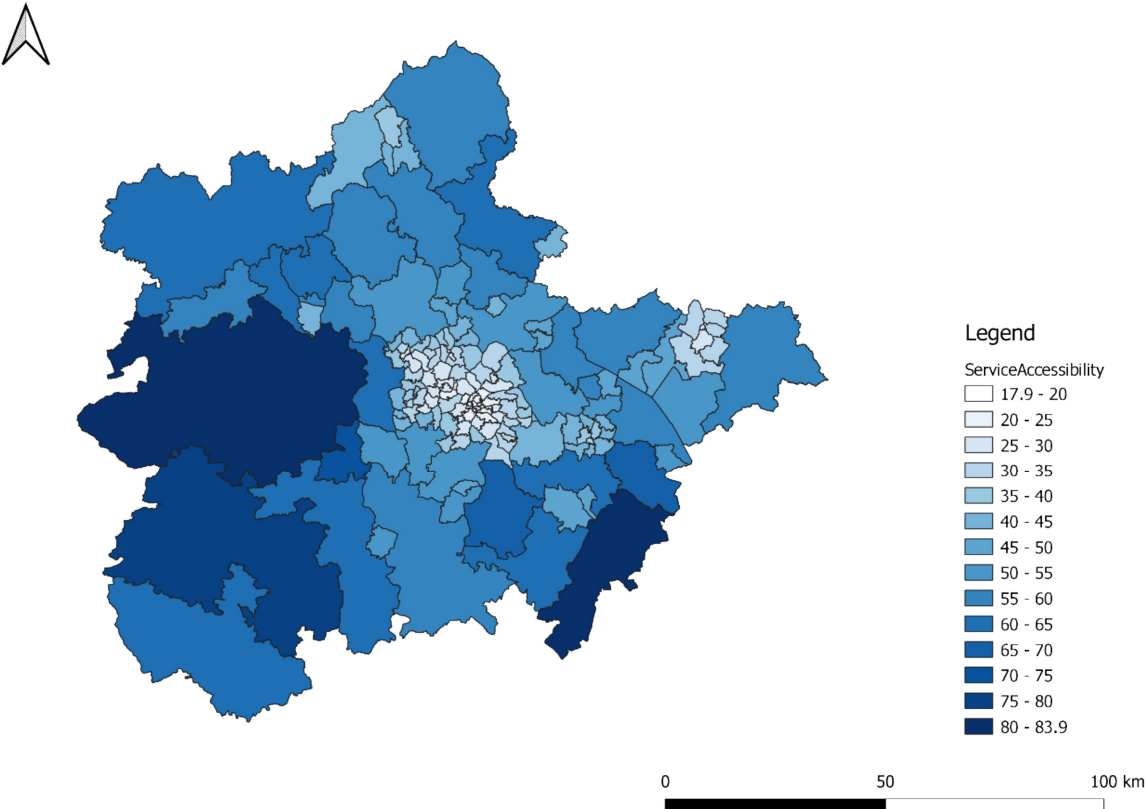
Employment:

- Different patterns
- Increase between urban cores
- Not balanced (urban scale)
- Attracted from adjacent zones

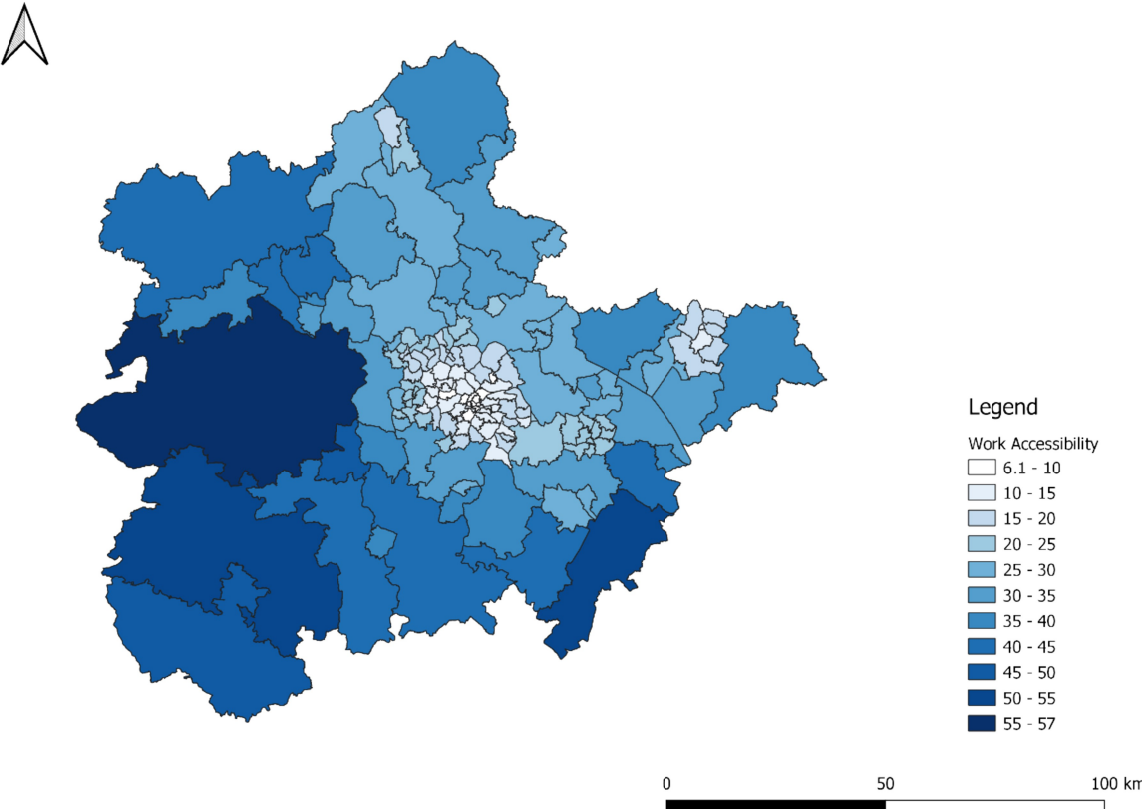


Simulation Results

Difference of Accessibility to Services of future scenarios to BAU scenario for the final simulation year



Difference in Accessibility to Work of future scenarios to BAU scenario for the final simulation year



Conclusions

- Total population in the next 15 years is not significantly different in the test scenarios from the BAU scenario.
- Allocation of population in the region and a tendency towards urban sprawl
- Working adults change residential location than retired population
- Total regional employment increase in the test scenarios
- The highest increase in employment was found in the areas located in between major urban cores.
- Working from home did not influence land use results

Conclusions

Limitations

Data availability, Micro-mobility, Cost related variables of the MIM and Full availability offered (rare in practice)

Further research:

1. Scenarios with other transportation options
2. Different case studies, as for example for countries of the developing world
3. Data regarding the availability of transport business models
4. Parking scenarios for CAVs

Thank you for your attention!

Dr Paraskevi Sarri

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Special thanks to the University of Southampton for funding this work, Dr. David Simmonds and the David Simmonds Consultancy LTD for all the technical assistance, Transport for West Midlands for assisting in the survey distribution, and the Transportation Research Group